Undergraduate Degree Program
Program - CEC Biomedical Engineering SLO (BS)

Mission Statement
The mission of the Biomedical Engineering Department is to bridge engineering, science and medicine, to educate and train the next generation of diverse biomedical engineers, to promote a culture of inclusion amongst all biomedical engineers, to conduct research leading to significant discoveries in medical sciences, to develop innovative medical technology, to translate scientific discovery and medical technology to industry or clinical practice and engage with the regional to international community for knowledge dissemination.

Outcomes
FIU graduates should be able to achieve the following:

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<tr>
<th>Content Knowledge and Skills (including Technology)</th>
<th>Direct Measures</th>
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<tr>
<td><strong>Knowledge of Mathematics</strong></td>
<td><strong>Procedure:</strong></td>
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| Graduates will be able to apply knowledge of mathematics including differential equations and statistics, physical and life sciences, and engineering to carry out analysis and design to solve problems at the interface of engineering and biology. | **Assessment Instrument:** Rubric  
**Assessment Method:** Assessment #1  
Direct Measures: The Senior Design External Evaluation form is filled out for each senior design team by outside evaluators chosen from local industry and other academic institutions. A similar taxonomy is used for this form as was used for the Senior Design Faculty Evaluation ranging from Poor to Excellent with the same 5-point grading scale.  
Scale used (see attached for scale description):  
(4) Excellent  
(3) Very Good  
(2) Good  
(1) Fair  
(0) Poor  
**Course Assessed:** BME 4908  
**Sampling:** Biomedical Engineering BS Students in senior design course.  
**Minimum Criteria for Success:**  
1. Senior Design External Evaluation- Students will achieve 2.5 or better.  
2. Senior Design Faculty Assessment- Students will achieve 2.5 or better.  
**Assessment Instrument:** Rubric  
**Assessment Method:** Assessment #2  
Direct Measure: Laboratory Evaluation Forms assess student performance based on specific criteria which are filled out by the Laboratory Instructor at the end of the course. The evaluation sheet contains a list of core competencies important to the program and a series of questions relating to each of these core competencies. Each question is weighted with respect to how important it is to the particular student learning outcome and is scored using the following taxonomy. The taxonomy for this evaluation ranges from Poor to Excellent where Poor corresponds to 0 and Excellent corresponds to 4.  
Scale used (see attached for scale description):  
(4) Excellent  
(3) Very Good |
Graduates will be able to design a system, component, or process to meet desired needs, including systems that involve the interaction between living and non-living materials, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

**Course Assessed:** BME 4050L  
**Sampling:** Biomedical Engineering BS Students.  
**Minimum Criteria for Success:** Students will score 2.5 or above.

**Critical Thinking**

**Direct Measures**

**Procedure:**

**Assessment Instrument:** Rubric  
**Assessment Method:** Assessment #1  
Direct Measures: Senior Design assessments include the Senior Design Faculty Evaluation form and the Senior Design External Evaluation Form. The Senior Design Faculty Assessment is filled out by the Senior Design Faculty member responsible for mentoring the team and is filled out for each member in the team. Each student is assessed by the faculty member with regards to a number of specific questions which are directly related to critical thinking.

The Senior Design External Evaluation form is filled out for each senior design team by outside evaluators chosen from local industry and other academic institutions. A similar taxonomy is used for this form as was used for the Senior Design Faculty Evaluation ranging from Poor to Excellent with the same 5-point grading scale.

Scale used (see attached for scale description):  
(4) Excellent  
(3) Very Good  
(2) Good  
(1) Fair  
(0) Poor

**Course Assessed:** BME4908  
**Sampling:** Biomedical Engineering BS Students in Senior Design course.  
**Minimum Criteria for Success:** 1. Senior Design External Evaluation - Students will achieve 2.5 or better.  
2. Senior Design Faculty Assessment- Students will achieve 2.5 or better.

**Assessment Instrument:** Rubric  
**Assessment Method:** Assessment #2  
Direct Measure: Laboratory Evaluation Forms assess student performance based on specific criteria which are filled out by the Laboratory Instructor at the end of the course. The evaluation sheet contains a list of core competencies important to the program and a series of questions relating to each of these core competencies. Each question is weighted with respect to how important it is to the particular student learning outcome and is scored using the following taxonomy. The taxonomy for this evaluation ranges from Poor to Excellent where Poor corresponds to 0 and Excellent corresponds to 4.

Scale used (see attached for scale description):  
(4) Excellent  
(3) Very Good  
(2) Good  
(1) Fair
<table>
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<tr>
<th>Communication (Oral or Written)</th>
<th>Direct Measures</th>
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<tr>
<td>Communicate Effectively in BME - Written</td>
<td>Procedure:</td>
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Graduates will be able to communicate effectively through written assignments/reports (scientific writing) in the field of Biomedical Engineering.

Assessment Instrument: Rubric
Assessment Method: Graduates are assessed on their ability to convey a deep understanding of the experimental process and report results scientifically. They are also assessed on their ability to communicate why certain phenomenon are observed and make statements about future protocols to explore. Graduates are also assessed by external judges on their technical writing skills to assemble Design History Files (DHF) and Device Master Records (DMR) describing their innovative research in senior design.

Scientific Laboratory Reports: graded 1-4
DHF and DMR subsections of the Senior Design Faculty Evaluations: graded 1-5

For written communication in BME labs (graded 1-4) the metric is:
- 4.0 - 3.6 Expert
- 3.6 - 3.2 Proficient
- 3.1 - 2.8 Apprentice
- 2.7 - 2.4 Novice
- <2.4 Poor

For written communication in Senior (BME4908) graded 1-5 the metric is:
- 5 Excellent
- 4 Very Good
- 3 Good
- 2 Fair
- 1 Poor

Course Assessed: BME4908, BME4050/4051L
Sampling: BME students in Senior Design and Senior Laboratory classes with passing grades were sampled since these are capstone courses with all outcomes having high importance.
Minimum Criteria for Success: 1. BME4050/4051L: 80% of students will score at least achieve = 2.5 out of 4
2. BME4908: Students will score at least 4 out of 5

Communicate Effectively in BME - Oral

Graduates will be able to communicate effectively to their peers orally in the field of Biomedical Engineering.

Assessment Instrument: Rubric
Assessment Method: Graduates are assessed by external judges in their ability to communicate their senior design projects through live presentations, followed by a Q & A. This includes the graduates ability to define the gap in knowledge, the social and/or environmental impacts, and the scientific details of their innovation(s).

15-20 minute oral group presentations graded by a score sheet filled out by the faculty mentor: graded 1-10

Course Assessed: BME4908
Sampling: All senior design students assigned in groups were sampled since this class assessed oral communication skills to
peers/community with most emphasis.

**Minimum Criteria for Success:** BME4908: Students will score at least an 8 out of 10